

**CLAIMS**

What is claimed is:

1. A system, comprising:  
5 a motor estimation module adapted to establish estimated values of a plurality of electrical parameters of an electric motor based on electrical input data; and  
an energy analysis module adapted to establish energy performance indicia of the electric motor.
- 10 2. The system as recited in claim 1, wherein the motor estimation module is operable to establish an estimated value of an operating parameter of the electric motor based on the estimated values of electrical parameters of the electric motor.
- 15 3. The system as recited in claim 2, wherein the operating parameter is motor torque.
4. The system as recited in claim 2, wherein the operating parameter is motor efficiency.
- 20 5. The system as recited in claim 2, wherein the operating parameter is output power.
6. The system as recited in claim 2, wherein the operating parameter is rotor temperature.
- 25 7. The system as recited in claim 1, wherein the energy analysis module comprises an energy usage module adapted to establish energy usage data of the electric motor.

8. The system as recited in claim 1, wherein the energy analysis module comprises an energy savings module adapted to establish energy savings data of an alternative electric motor versus the electric motor.

5 9. The system as recited in claim 1, comprising a monetary analysis module adapted to establish monetary performance indicia of the electric motor based at least partially on the energy performance indicia.

10 10. The system as recited in claim 9, wherein the monetary analysis module comprises a cost analysis module adapted to establish operational cost data of the electric motor.

15 11. The system as recited in claim 9, wherein the monetary analysis module comprises a monetary savings module adapted to establish operational savings data of an alternative electric motor versus the electric motor.

12. The system as recited in claim 1, comprising a database of customer motors and operational data of the customer motors.

20 13. The system as recited in claim 1, comprising a database of alternative motors and operational data of the alternative motors.

25 14. The system as recited in claim 1, comprising a database of motors and power losses of the motors.

30 15. The system as recited in claim 14, wherein the power losses comprise friction and windage losses.

16. A system, comprising:

a motor resistance processing module adapted to establish resistance data based on input data of the electric motor; and

a motor estimation module adapted to establish estimated values of a plurality of electrical parameters of an electric motor based on electrical input data and the cable resistance data.

17. The system as recited in claim 16, wherein the motor resistance processing module comprises a temperature compensation module adapted to establish current resistance data based on current temperature data and baseline temperature and resistance data.

18. The system as recited in claim 16, wherein the motor resistance processing module comprises a cable resistance calculation module adapted to establish cable resistance data based on a cable gauge, a number of cables per phase, a cable length, and a cable temperature.

19. The system as recited in claim 16, wherein the motor estimation module is operable to establish an estimated value of an operational performance parameter of the electric motor based on the estimated values of electrical parameters of the electric motor.

20. The system as recited in claim 16, comprising a visual display operable to provide a visual indication of at least one of the estimated values.

21. The system as recited in claim 16, comprising a keyboard operable to facilitate manual entry of motor data.

22. The system as recited in claim 16, comprising at least one database of motor data.

23. The system as recited in claim 22, wherein the at least one database comprises a customer motor database having operational data of customer motors, motor applications, and performance data of the customer motors.

5 24. The system as recited in claim 22, wherein the at least one database comprises a replacement motor database having operational data of alternative motors.

25. The system as recited in claim 22, wherein the at least one database comprises a motor loss database having power losses correlated with various parameters of  
10 the electric motor.

26. The system as recited in claim 16, comprising a data storage and access module adapted to identify a motor test record according to at least one test identifier and to provide data from the motor test record to the motor estimation module.

15 27. The system as recited in claim 26, wherein the data storage and access module comprises a data population module adapted to populate fields of the motor estimation module with input current, input voltage, and output speed of the electric motor.

20 28. A system, comprising:  
at least one database of motor data;  
a data storage and access module adapted to identify data records in the at least one database; and  
a motor estimation module adapted to establish estimated values of a plurality of  
25 electrical parameters of an electric motor based on electrical input data and the cable resistance data.

29. The system as recited in claim 28, wherein the motor estimation module is operable to establish an estimated value of an operational performance parameter of the  
30 electric motor based on the estimated values of electrical parameters of the electric motor.

30. The system as recited in claim 28, comprising a visual display operable to provide a visual indication of at least one of the estimated values.

5 31. The system as recited in claim 28, comprising a keyboard operable to facilitate manual entry of motor data.

32. The system as recited in claim 28, wherein the at least one database comprises a customer motor database having operational data of customer motors, motor  
10 applications, and performance data of the customer motors.

33. The system as recited in claim 28, wherein the at least one database comprises a replacement motor database having operational data of alternative motors.

15 34. The system as recited in claim 28, wherein the at least one database comprises a motor loss database having power losses correlated with various parameters of the electric motor.

20 35. The system as recited in claim 34, wherein the power losses comprise friction and windage losses correlated with various parameters of the electric motor.

36. The system as recited in claim 28, wherein the data storage and access module comprises a data logging module adapted to record the electrical input data into the data records for a desired test of the electric motor.

25 37. The system as recited in claim 28, wherein the data storage and access module comprises a data identification module adapted to identify a log of a desired test of the electric motor based on at least one test identifier.

38. The system as recited in claim 28, wherein the data storage and access module comprises a data population module adapted to populate fields of the motor estimation module with logged data for a desired test of the electric motor.

5           39. The system as recited in claim 38, wherein the logged data comprises the electrical input data and at least one operational parameter of the electric motor.

40. The system as recited in claim 39, wherein the electrical input data comprises input current, input voltage, and frequency of the electric motor.

10           41. The system as recited in claim 39, wherein the at least one operational parameter comprises an output speed of the electric motor.

42. A system comprising:  
15           means for obtaining electrical parameters of an electric motor based on electrical input data of the electric motor; and  
            means for establishing energy and monetary comparison criteria between the electric motor and an alternative motor.

20           43. The system as recited in claim 42, further comprising means for estimating at least one operating parameter of the electrical motor based at least partially on the means for obtaining electrical parameters.

44. A system comprising:  
25           means for establishing resistance data based on input data of an electric motor; and  
            means for estimating electrical parameters of the electric motor based on the resistance data and electrical input data of the electric motor.

45. The system as recited in claim 44, further comprising means for estimating at least one operating parameter of the electrical motor based at least partially on the means for obtaining electrical parameters.

5 46. The system as recited in claim 44, further comprising means for establishing current resistance data based on current temperature data and baseline temperature and resistance data.

10 47. The system as recited in claim 44, further comprising means for establishing cable resistance data based on a cable gauge, a number of cables per phase, a cable length, and a cable temperature.

48. A program for analyzing an electric motor, comprising:  
a machine readable medium;  
15 a motor estimation module stored on the machine readable medium and adapted to establish estimated values of a plurality of electrical parameters of the electric motor based at least partially on measured motor parameters; and  
a monetary analysis module adapted to establish monetary comparison data of the electric motor versus an alternative motor.

20 49. The program as recited in claim 48, wherein the motor estimation module is adapted to estimate an operating parameter of the electric motor based at least partially on the estimated values.

25 50. The program as recited in claim 48, wherein the monetary analysis module comprises a cost analysis module adapted to establish operational cost data of the electric motor.

51. The program as recited in claim 48, further comprising an energy analysis module adapted to establish energy comparison data of the electric motor versus the alternative motor.

5 52. A method of analyzing a motor having a rotor and a stator, comprising:  
providing an instrumentation system with motor input data;  
operating the instrumentation system to establish estimated values of a plurality of  
electrical parameters of the motor based on the motor input data; and  
engaging the instrumentation system to establish performance comparison data  
10 between the motor and at least one alternative motor.

53. The method as recited in claim 52, further comprising operating the instrumentation system to estimate at least one motor operating parameter based on the estimated values and the motor input data.

15 54. The method as recited in claim 52, wherein engaging comprises obtaining monetary comparison data of operating costs of the motor and the at least one alternative motor.

20 55. The method as recited in claim 52, wherein engaging comprises obtaining energy usage comparison data between the motor and the at least one alternative motor.

56. A method of operating a motor having a rotor and a stator, comprising:  
accessing at least one motor database;  
25 providing the instrumentation system with electrical input data obtained during testing of the motor; and  
operating the instrumentation system to establish estimated values of a plurality of electrical parameters of the motor based at least partially on the motor database and the electrical input data.

57. The method as recited in claim 56, wherein accessing comprises retrieving friction and windage loss data for the motor

58. The method as recited in claim 56, wherein accessing comprises retrieving previous testing data for the motor.

59. The method as recited in claim 58, wherein retrieving previous testing data comprises obtaining the electrical input data and at least one operational parameter of the motor.

60. The method as recited in claim 56, wherein accessing comprises retrieving customer motor data logged for a particular customer.

61. The method as recited in claim 56, further comprising operating the instrumentation system to estimate at least one motor operating parameter based on the estimated values, the motor database, and the electrical input data.

62. A method of operating a motor having a rotor and a stator, comprising:  
establishing resistance data based on input data of an electric motor; and  
estimating electrical parameters of the electric motor based on the resistance data and electrical input data of the electric motor.

63. The method as recited in claim 62, further comprising estimating at least one operating parameter of the electrical motor based at least partially on the resistance data and the electrical parameters.

64. The method as recited in claim 62, wherein establishing resistance data comprises establishing current resistance data based on current temperature data, baseline temperature data, and baseline resistance data.

65. The method as recited in claim 62, wherein establishing resistance data comprises establishing cable resistance data based on a cable gauge, a number of cables per phase, a cable length, and a cable temperature.